

# Applied Radiation and Isotopes

International Journal of Radiation  
Applications and Instrumentation Part A

Volume 40, 1989

List of Contents and Author Index



**PERGAMON PRESS**

OXFORD · NEW YORK · BEIJING · FRANKFURT  
SÃO PAULO · SYDNEY · TOKYO · TORONTO

# APPLIED RADIATION AND ISOTOPES

INTERNATIONAL JOURNAL OF RADIATION APPLICATIONS AND INSTRUMENTATION PART A

## EDITORS-IN-CHIEF

H. SELIGMAN (Editor-in-Chief) *c/o International Atomic Energy Agency, P.O. Box 200, A-1400, Vienna, Austria*

W. L. McLAUGHLIN (Editor-in-Chief for North America) *Radiation Physics Division, National Institute of Standards and Technology, Gaithersburg, MD 20899, U.S.A.*

## CONSULTING EDITOR EMERITUS

W. B. MANN, *National Institute of Standards and Technology, Gaithersburg, MD 20899, U.S.A.*

## EDITORS

G. A. BRINKMAN, *NIKHEF-K, P.O. Box 41882, 1009 DB Amsterdam, The Netherlands*

C. G. CLAYTON, *Sprole House, 125 Knights End Road, March, Cambridgeshire PE15 9QD, England*

B. M. COURSEY, *Center for Radiation Research, National Institute of Standards and Technology, Gaithersburg, MD 20899, U.S.A.*

W. C. ECKELMAN, *Squibb Institute for Medical Research, P.O. Box 191, New Brunswick, NJ 08903, U.S.A.*

E. A. EVANS, *Group Patents Manager, Amersham International, Amersham Place, Little Chalfont, Buckinghamshire HP7 9NA, England*

T. FLORKOWSKI, *Institute of Physics & Nuclear Techniques, Academy of Mining & Metallurgy, Al. Mickiewicza 30, 30-059 Krakow, Poland*

J. H. HUBBELL, *National Institute of Standards and Technology, Gaithersburg, MD 20899, U.S.A.*

A. J. PALMER, *75 Downs Road, Langley, Slough, Berkshire SL3 7DA, England*

D. M. TAYLOR, *IGT, Kernforschungszentrum Karlsruhe, Postfach 3640, D-75 Karlsruhe, F.R.G.*

T. TOMINAGA, *Department of Chemistry, Faculty of Science, University of Tokyo, Bunkyo-ku, Tokyo, Japan*

L. I. WIEBE, *Faculty of Pharmacy and Pharmaceutical Sciences, Slowpoke Reactor Facility, University of Alberta, Edmonton, Canada T6G 2N8*

---

**Publishing Office:** Pergamon Press plc, Journals Production Unit, Hennock Road, Marsh Barton, Exeter EX2 8NE, England  
(Tel. Exeter (0392) 51558; Telex 42749)

**Subscription and Advertising Offices:** North America: Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523, U.S.A.

Rest of the World: Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, England (Tel. Oxford (0865) 64881)

**Institutional Subscription Rates 1990.** Part A, *Applied Radiation and Isotopes*: 1-yr, DM 1080.00; 2-yr, DM 2052.00. Combined subscriptions Parts A-E: 1-yr, DM 3390.00; 2-yr, DM 6441.00. Part B, *Nuclear Medicine and Biology*: 1-yr, DM 580.00; 2-yr, DM 1102.00. Part C, *Radiation Physics and Chemistry*: 1-yr, DM 1300.00; 2-yr, DM 2470.00. Part D, *Nuclear Tracks and Radiation Measurements*: 1-yr, DM 610.00; 2-yr, DM 1159.00. Part E, *Nuclear Geophysics*: 1-yr, DM 420.00; 2-yr, DM 798.00. All prices are subject to amendment without notice.

**Personal Subscription Rate.** For those whose library subscribes at the regular rate (1990), DM 216.00.

**Back Issues:** Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Pergamon Press offices.

*Published monthly*

Copyright © 1989 Pergamon Press plc

It is a condition of publication that manuscripts submitted to this journal have not been published and will not be simultaneously submitted or published elsewhere. By submitting a manuscript, the authors agree that the copyright for their article is transferred to the publisher if and when the article is accepted for publication. However, assignment of copyright is not required from authors who work for organizations which do not permit such assignment. The copyright covers the exclusive rights to reproduce and distribute the article, including reprints, photographic reproductions, microform or any other reproductions of similar nature and translations. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrostatic, magnetic tape, mechanical, photocopying, recording or otherwise, without permission in writing from the copyright holder.

**Photocopying Information for users in the U.S.A.** The Item-fee Code for this publication indicates that authorization to photocopy items for internal or personal use is granted by the copyright holder for libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service provided the stated fee for copying, beyond that permitted by Section 107 or 108 of the U.S. Copyright Law, is paid. The appropriate remittance of \$3.00 per copy per article is paid directly to the Copyright Clearance Center Inc., 27 Congress Street, Salem, MA 01970, U.S.A.

**Permission for other use.** The copyright owner's consent does not extend to copying for general distribution, for promotion, for creating new works or for resale. Specific written permission must be obtained from the publisher for such copying.

*The Item-fee Code for this publication is: 0883-2889/89 \$3.00 + 0.00*

©<sup>TM</sup> The paper used in this publication meets the minimum requirements of American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984.



# CONTENTS OF VOLUME 40

## Number 1

- |                                                                                              |                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| David Alexoff, David J. Schlyer<br>and Alfred P. Wolf                                        | 1 Recovery of [ $^{18}\text{F}$ ]fluoride from [ $^{18}\text{O}$ ]water in an electrochemical cell                                                                          |
| D. A. Schauer, G. H. Zeman<br>and T. C. Pellmar                                              | 7 A low-energy x-ray irradiator for electrophysiological studies                                                                                                            |
| Andrzej Zastawny, Jan Białoń<br>and Tadeusz Sosiński                                         | 19 Changes in the surface radioactivity of lead—the effect of the diffusion of bismuth and polonium radioisotopes                                                           |
| Kenneth W. Reed, Clarence T. Ueda,<br>Wallace J. Murray<br>and Samuel C. Augustine           | 27 Radiolabeled 9- or 10-monoiodostearic acid and 9- or 10-mono-iodostearyl carnitine—I. Synthesis and purification                                                         |
| Ravinder Kaur and P. N. Trehan                                                               | 33 Lifetime measurement of the 2083.1-keV level in $^{140}\text{Ce}$ and the 1289.15-keV level in $^{182}\text{W}$                                                          |
| G. Skarnemark, M. Skälberg,<br>R. K. Tokay, P. Hölttä and R. Rosenberg                       | 37 The influence of an additional filter in epithermal neutron activation analysis                                                                                          |
| Nobuo Shinohara and Nobuaki Kohno                                                            | 41 Rapid preparation of high-resolution sources for alpha-ray spectrometry of actinides in spent fuel                                                                       |
| Gerard W. M. Visser, Anita T. Bijma,<br>Jessica A. R. Dijkman<br>and Jacobus D. M. Herscheid | 47 Synthesis of $^{18}\text{F}$ -labelled VP 16-213 and podophyllotoxin using acetyl hypofluorite                                                                           |
| Hideki Namba, Okihiro Tokunaga<br>and Nobutake Suzuki                                        | 53 Oxygen gas dosimeter for flow systems                                                                                                                                    |
| E. Poupeye, R. E. Counsell, A. De Leenheer,<br>G. Slegers and P. Goethals                    | 57 Synthesis of $^{11}\text{C}$ -labelled thymidine for tumor visualization using positron emission tomography                                                              |
| Tjoe-Pa Lim, Nand K. Dave<br>and Normand R. Cloutier                                         | 63 High resolution alpha-particle-spectrometry for radium analysis—the effects of sample thickness and filter pore size                                                     |
| Michael E. Ebefegha                                                                          | 73 Optimum neutron source to subject distance (ONSSD) and the influence of air-gap on body irradiation in activation analysis                                               |
| Y. Hino and Y. Kawada                                                                        | 79 Standardization of $^{109}\text{Cd}$ by $4\pi\text{-}\alpha$ coincidence counting with a conventional gas flow counter and measurement of the 88-keV gamma-ray intensity |
| Fernando Legarda, Margarita Herranz<br>and Oscar Martinez de Lafuente                        | 85 A semiempirical formula for the photoelectric cross-section for photon energies up to 1 MeV                                                                              |
| <i>Technical Notes</i>                                                                       |                                                                                                                                                                             |
| I. S. Anand and R. Benzing                                                                   | 89 A simple automatic gamma counter based upon the IAEA radio-immunoassay instrument                                                                                        |
| M. J. Adam, J. R. Grierson and S. Jivan                                                      | 91 An improved HPLC system for the analysis and purification of organic amine radiopharmaceuticals                                                                          |
| Linda V. E. Caldas, Dieter F. Regulla<br>and Peter Pychlau                                   | 93 Ionization chamber extension cables: radiation effects                                                                                                                   |
| Annette Proulx, James R. Ballinger<br>and Karen Y. Gulenchyn                                 | 95 Routine determination of radiochemical purity of $^{99\text{m}}\text{Tc}$ -MIBI                                                                                          |
| Events                                                                                       | 99                                                                                                                                                                          |

## Number 2

- |                |                                                                                                                     |
|----------------|---------------------------------------------------------------------------------------------------------------------|
| R. J. N. Brits | 103 $^{81}\text{Rb}/\text{Na}$ separation for the production of a $^{81}\text{Rb}/^{81\text{m}}\text{Kr}$ generator |
| Heitor Silva   | 109 The effect of grain size and Teflon matrix on the energy dependence of thermoluminescent dosimeters             |

|                                                                                   |     |                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D.-R. Hwang, C. S. Dence, T. A. Bonasera and M. J. Welch                          | 117 | No-carrier-added synthesis of 3-[ <sup>18</sup> F]fluoro-1-(2-nitro-1-imidazolyl)-2-propanol. A potential PET agent for detecting hypoxic but viable tissues                                                                   |
| B. Scholten, S. M. Qaim and G. Stöcklin                                           | 127 | Excitation functions of proton induced nuclear reactions on natural tellurium and enriched <sup>123</sup> Te: production of <sup>123</sup> I via the <sup>123</sup> Te(p,n) <sup>123</sup> I-process at a low-energy cyclotron |
| Emil Proksch, Peter Gehringer, Walter Szinovatz and Helmut Eschweiler             | 133 | Radiation-induced decomposition of small amounts of trichloroethylene in drinking water                                                                                                                                        |
| L. A. R. da Rosa                                                                  | 139 | The influence of temperature and humidity on the stability of the response of different thermoluminescent detectors                                                                                                            |
| M.-C. Lasne, V. W. Pike and D. R. Turton                                          | 147 | The radiosynthesis of [ <i>N</i> -methyl- <sup>11</sup> C]sertraline                                                                                                                                                           |
| R. J. A. Nieuwland, H. A. Das and C. L. de Ligny                                  | 153 | Improvement of the reproducibility of ion-pair HPLC of <sup>99m</sup> Tc(Sn)EHDP complexes and the influence of the Sn(II) concentration on the composition of the reaction mixture                                            |
| E. H. El-Kalla, F. A. Rahman and A. A. Maaty                                      | 159 | The effect of neutron irradiation on the magnetic properties of low carbon steels                                                                                                                                              |
| N. Mansour, T. Bayomy and Z. Awwad                                                | 163 | Nuclear shape transitions and some properties of aligned-particle configurations at very high spin in some rare-earth nuclei                                                                                                   |
| J. Ulin, A. D. Gee, P. Malmberg, J. Tedroff and B. Långström                      | 171 | Synthesis of racemic (+) and (−) <i>N</i> -[methyl- <sup>11</sup> C]nomifensine, a ligand for evaluation of monoamine re-uptake sites by use of positron emission tomography                                                   |
| Marian Czauderna and Małgorzata Rochalska                                         | 177 | Effect of Cd on tissue levels of Se, Zn, Fe, Co and Rb                                                                                                                                                                         |
| C. Brihaye, S. Dewez, M. Guillaume, A. P. Callahan, D. E. Rice and F. F. Knapp Jr | 183 | Reactor production and purification of osmium-191 for use in a new <sup>191</sup> Os/ <sup>191m</sup> Ir radionuclide generator system                                                                                         |
| Events                                                                            | 193 |                                                                                                                                                                                                                                |

### Number 3

|                                                                             |     |                                                                                                                                                                |
|-----------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B. M. Oliver, M. M. Bretscher and Harry Farrar IV                           | 199 | Mass spectrometric determinations of the absolute tritium activities of NBS tritiated water standards                                                          |
| T. Yeşin and N. Çakır                                                       | 209 | Caesium-137 and caesium-134 levels in soil in a tea plantation in Turkey after the Chernobyl accident                                                          |
| N. Mansour and V. Martynov                                                  | 213 | Compton-suppression spectrometer for in-beam coincidence measurements and proposal for a detector configuration consisting of systems with a large solid angle |
| N. Mansour, T. Bayomy and Z. Awwad                                          | 217 | Identification of single-particle configurations at very high spin in some rare-earth nuclei                                                                   |
| B. Zmbova, D. Djokić, V. Bogdanova, I. Tadžer, B. Ajdinović and M. Rastovac | 225 | Synthesis of <i>p</i> -aminohippuric acid analog and its labeling by technetium-99m                                                                            |
| Haruo Fujii, Makoto Takiue and Hiroaki Ishikawa                             | 235 | New emulsive scintillator for liquid scintillation measurements                                                                                                |
| Paul Singh, N. Singh and S. K. Chakravarti                                  | 239 | Electrolytical studies of submicroscopic pores in ultraviolet irradiated Makrofol nuclear track filters                                                        |
| F. A. Balogun and C. A. Adesanmi                                            | 243 | Grain-size optimization in lyoluminescence dosimetry                                                                                                           |
| W. R. Dixon, R. S. Storey, L. van der Zwan and B. A. Logan                  | 247 | Energy of the first excited state of <sup>151</sup> Eu                                                                                                         |
| Douglas N. Abrams, Rene C.-Gaudreault and Antoine A. Noujaim                | 251 | A simple synthesis of radiolabelled bromoacetic acid                                                                                                           |



|                                                                      |     |                                                                                                              |
|----------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------|
| A. S. Makarious, M. A. El-Kolaly,<br>I. I. Bashter and W. A. Kansouh | 257 | Radiation distribution through ilmenite-limonite concrete and its application as a reactor biological shield |
| <i>Technical Notes</i>                                               |     |                                                                                                              |
| Karl-Olof Schoeps, Sharon Stone-Elander<br>and Christer Halldin      | 261 | On-line synthesis of [ $^{11}\text{C}$ ]nitroalkanes                                                         |
| C. A. Adesanmi                                                       | 263 | Multielement analysis of Nigerian chewing sticks by cyclic neutron activation analysis (CNAA)                |
| <i>Letter to the Editors</i>                                         |     |                                                                                                              |
| Patricia Landais and Ronald Finn                                     | 265 | On-line preparation of [ $^{11}\text{C}$ ]carbon dioxide from [ $^{11}\text{C}$ ]methane                     |
| <i>Announcement</i>                                                  | 267 |                                                                                                              |
| <i>Events</i>                                                        | 269 |                                                                                                              |

## Number 4

|                                                                         |     |                                                                                                                                                                                              |
|-------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C. Morel and J. C. Fardeau                                              | 273 | The uptake by crops of fresh and residual phosphatic fertilizers by simultaneous measurements with $^{32}\text{P}$ and $^{33}\text{P}$                                                       |
| Raymond Reilly, Katherine Sheldon,<br>Alexander Marks and Sylvain Houle | 279 | Labelling of monoclonal antibodies 10B, 8C, and M2A with indium-111                                                                                                                          |
| M. Isoyama, T. Fukuhara, M. Tanaka,<br>A. Shimada and S. Yuasa          | 285 | Radiochromatographic resolution of [ $^{14}\text{C}$ ]DL-tryptophan, [ $^{14}\text{C}$ ]DL-phenylalanine and [ $^{35}\text{S}$ ]DL-methionine on a cellulose column                          |
| Yuko Murase, Yoshio Homma,<br>Makoto Takiue and Tamaru Aburai           | 291 | Determination of air luminescence spectra for alpha-emitters with liquid scintillation spectrometers                                                                                         |
| Yuko Murase, Yoshio Homma<br>and Makoto Takiue                          | 295 | Effect of air luminescence counts on determination of $^{222}\text{Rn}$ by liquid scintillation counting                                                                                     |
| S. Kishimoto, Y. Isozumi, S. Ito,<br>R. Katano and H. Takekoshi         | 299 | A simple crystal spectrometer for low-energy x-rays emitted from radioactive sources                                                                                                         |
| A. Hanser                                                               | 309 | Routine production of high purity $^{81}\text{Rb}$ by means of electro-magnetic isotope separation                                                                                           |
| W. L. Cheng, C. S. Lee, C. C. Chen,<br>Y. M. Wang and G. Ting           | 315 | Study on the separation of molybdenum-99 and recycling of uranium to water boiler reactor                                                                                                    |
| F. Brady, S. K. Luthra and V. W. Pike                                   | 325 | Nucleophilic substitution at cyclic sulphamates—routes to NCA [ $^{18}\text{F}$ ]fluoro-analogues of MK 801                                                                                  |
| Tien-Ko Wang, Pin-Chieh Hsu<br>and Pao-Shan Weng                        | 329 | Application of $\text{CaF}_2:\text{Tm}$ (TLD-300) dosimeter to the discrimination between alpha, beta and gamma radiation                                                                    |
| <i>Technical Notes</i>                                                  |     |                                                                                                                                                                                              |
| G. G. Eichholz and S. W. Poppell                                        | 337 | Dose rate effects in the control of iron bacteria by irradiation                                                                                                                             |
| A. A. Fahad                                                             | 340 | A computer-controlled dual-gamma scanner for measurement of soil water content and bulk density                                                                                              |
| Hiroshi Miyahara, Shooji Kitaori,<br>Yasunori Nozue and Tamaki Watanabe | 343 | A $4\pi\beta(\text{ppc})-\gamma$ (HPGe) coincidence apparatus using a live-timed bi-dimensional data acquisition system and its application to measurement of gamma ray emission probability |
| Nobuo Shinohara and Nobuaki Kohno                                       | 346 | A comparative study of alpha-spectrometric methods for determination of americium and curium in spent fuel                                                                                   |
| S. Biramontri, W. Thongmitr<br>and W. Wanitsuksombut                    | 349 | Dosimetry for commissioning and quality control in the irradiation of onions                                                                                                                 |
| <i>Letter to the Editors</i>                                            |     |                                                                                                                                                                                              |
| J. Kits, R. Bludovský and F. Látal                                      | 355 | Radioactive isotopes in clinical medicine and research—measurement of cpm or dpm?                                                                                                            |
| <i>Announcement</i>                                                     | 357 |                                                                                                                                                                                              |
| <i>Events</i>                                                           | 359 |                                                                                                                                                                                              |

## Number 5

|                                                                                           |     |                                                                                                                                  |
|-------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------|
| G. Perez, E. Possagno and E. Lilla                                                        | 365 | Protonation of <i>o</i> -terphenyl by decay and radiolysis techniques                                                            |
| Alan A. Wilson, Robert F. Dannals,<br>Hayden T. Ravert and Henry N. Wagner Jr             | 369 | Preparation of [ <sup>11</sup> C]- and [ <sup>125</sup> I]IMB: a dopamine D-2 receptor antagonist                                |
| Carlo Bui, Luisa Confalonieri and<br>Mario Milazzo                                        | 375 | Use of Compton scattering in quantitative XRF analysis of stained glass                                                          |
| H. Schrader                                                                               | 381 | Measurement of the half-lives of <sup>18</sup> F, <sup>56</sup> Co, <sup>125</sup> I, <sup>195</sup> Au and <sup>201</sup> Tl    |
| Ida De Gregori and Soledad Lobos                                                          | 385 | Electrochemical and chemical reduction of TcO <sub>4</sub> <sup>-</sup> in dithiols in alkaline aqueous media                    |
| G. Heusser, H. V. Klapdor, A. Piepke,<br>J. Schneider, N. Mansour and H. Strecker         | 393 | Construction of a low-level Ge detector                                                                                          |
| T. Suzuki, Y. Ito, K. Endo and S. Fujita                                                  | 397 | Positron annihilation and polymerization of epoxy                                                                                |
| Albert K. Ahafia                                                                          | 403 | A new method for the determination of nuclear activation cross-sections: the positron-positron technique                         |
| Albert K. Ahafia                                                                          | 407 | Ahagrapths: a new method for the accurate determination of half-lives                                                            |
| Siya Ram and Leonard D. Spicer                                                            | 413 | Synthesis of <sup>11</sup> C-labeled chlorpromazine directly from [ <sup>11</sup> C]carbon dioxide                               |
| Kh. M. Omar, S. S. Saad, N. Z. Darwish<br>and F. M. El-Ashry                              | 417 | Soliton potential, energy storage and anomalous large angle scattering of alpha-particles incident on <sup>40</sup> Ca           |
| Shetha S. Al-Dargazelli and Mazin M. Elias                                                | 421 | Iodine escape peak to photopeak intensity ratios in NaI(Tl) crystals                                                             |
| <i>Technical Notes</i>                                                                    |     |                                                                                                                                  |
| Siya Ram, Richard E. Ehrenkauser<br>and Leonard D. Spicer                                 | 425 | Synthesis of the labeled D <sub>1</sub> receptor antagonist SCH 23390 using [ <sup>11</sup> C]carbon dioxide                     |
| Munawwar Sajjad, H.-J. Machulla,<br>R. M. Lambrecht and Soliman Bakr                      | 428 | High specific activity 15-( <i>p</i> -[ <sup>123</sup> I]iodophenyl)pentadecanoic acid                                           |
| Y. M. Huigen, T. G. Tji, W. J. Gelsema<br>and C. L. De Ligny                              | 431 | A (re)investigation of the influence of some metal ions on the mean size of <sup>99m</sup> Tc(Sn)-MDP constituents at neutral pH |
| H. C. Padgett, D. G. Schmidt, A. Luxen,<br>G. T. Bida, N. Satyamurthy and<br>J. R. Barrio | 433 | Computer-controlled radiochemical synthesis: a chemistry process control unit for the automated production of radiochemicals     |
| <i>Announcements</i>                                                                      | 447 |                                                                                                                                  |
| <i>Events</i>                                                                             | 449 |                                                                                                                                  |

## Number 6

|                                                                                   |     |                                                                                                                 |
|-----------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------|
| Dale O. Kiewewetter, Thomas Brücke and<br>Ronald D. Finn                          | 455 | Radiochemical synthesis of [ <sup>18</sup> F]fluororaclopride                                                   |
| Cs. Ujhelyi                                                                       | 461 | Counting equipment "dead time" independent of net count rate of a radioisotope                                  |
| J. Al Mudaires, I. S. Abdul-Bari, J. Sabol and<br>C. M. Vasisht                   | 467 | Alpha activity measurement of cigarettes in Kuwait                                                              |
| A. S. Makarious and F. M. Sayedahmed                                              | 473 | Radial attenuation of thermal neutrons around a joint in a straight duct in an ilmenite concrete shield         |
| F. M. Sayedahmed, A. S. Makarious and<br>W. A. Kansouh                            | 477 | Void effects and the determination of "patches" for radiation distributions in heterogeneous multilayer shields |
| Pradeep K. Garg, Gerald E. Archer Jr,<br>Darell D. Bigner and Michael R. Zalutsky | 485 | Synthesis of radioiodinated N-succinimidyl iodobenzoate: optimization for use in antibody labelling             |



|                                                                                                     |     |                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kenji Yoshihara, Harumi Kaji,<br>Tsutomu Sekine, Tetsuo Nakajima and<br>Takeshi Mukoyama            | 491 | Photonuclear excitation of $^{103}\text{Rh}$ by synchrotron radiation                                                                                                                    |
| Haruo Fujii and Makoto Takiue                                                                       | 495 | Paraffin scintillator for radioassay of solid support samples                                                                                                                            |
| H. A. Wyllie                                                                                        | 501 | A method for the measurement of the intrinsic dead time of a counting system                                                                                                             |
| Kapil D. Ram and R. Tripathi                                                                        | 505 | Study of isotopic exchange reaction of iodine in neutral aqueous solutions of iodide-iodate system by radiotracer technique                                                              |
| Jiří Plch, Petr Kovář and Pavel Dryák                                                               | 513 | Absolute measurement of activity and total photon yield in the decay of $^{201}\text{Tl}$                                                                                                |
| Zs. Németh, T. Sekine and K. Yoshihara                                                              | 519 | Electron capture decay of $^{203}\text{Pb}$                                                                                                                                              |
| Atsushi Ando, Itsuko Ando,<br>Tatsunosuke Hiraki, Norihisa Yamada and<br>Kinichi Hisada             | 521 | Determination of the lysosomal role in tumor accumulation of $^{67}\text{Ga}$ by dual-tracer studies                                                                                     |
| Tjaart N. van der Walt, Paul P. Coetzee and<br>Pieter J. Fourie                                     | 525 | Indirect spectrophotometric determination of BIDA, DISIDA, DTPA and MDP in labelled compounds                                                                                            |
| <i>Technical Notes</i><br>Anthony L. Feliu                                                          | 531 | Designing flexible, "chemist-friendly" software to control a radio-chemistry autosynthesizer                                                                                             |
| R. Garcia Domenech, O. Abril Mendez,<br>J. Galvez Alvarez and A. Farga Marti                        | 536 | Physico-chemical study of the radiopharmaceuticals $^{99\text{m}}\text{Tc}$ -DMSA, $^{99\text{m}}\text{Tc}$ -EDTA and $^{99\text{m}}\text{Tc}$ -DTPA interaction with plasmatic proteins |
| Vijay Somayaji, Shosuke Ito,<br>Kowichi Jimbow and Leonard I. Wiebe                                 | 539 | The synthesis of 4-S-cysteinyl-[U- $^{14}\text{C}$ ]phenol, an experimental anti-melanoma agent                                                                                          |
| S. John Gatley                                                                                      | 541 | Rapid production and trapping of [ $^{18}\text{F}$ ]fluorotrimethylsilane, and its use in nucleophilic fluorine-18 labeling without an aqueous evaporation step                          |
| A. Z. Cuthbertson, J. C. Dighton and<br>B. D. Siebert                                               | 545 | A modified distillation technique for the recovery of tritium from blood                                                                                                                 |
| <i>Preliminary Communication</i><br>James R. Ballinger, Karen Y. Gulenchyn and<br>Mohamed N. Hassan | 547 | Technetium-99m spiperone dithiocarbamate: a potential radio-pharmaceutical for dopamine receptor imaging with SPECT                                                                      |
| <i>Announcement</i>                                                                                 | 551 |                                                                                                                                                                                          |
| <i>Events</i>                                                                                       | 552 |                                                                                                                                                                                          |

## Number 7

|                                                                                                                           |     |                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------|
| Christer Halldin, Peter Bjurling,<br>Carl-Göran Stålnacke,<br>Sukhinder Singh Jossan, Lars Orelund<br>and Bengt Långström | 557 | $^{11}\text{C}$ -labelling of dimethylphenethylamine in two different positions and biodistribution studies          |
| G. Antoni, J. Ulin and Bengt Långström                                                                                    | 561 | Synthesis of the $^{11}\text{C}$ -labelled $\beta$ -adrenergic receptor ligands atenolol, metoprolol and propranolol |
| Atsushi Takeda and Shoji Okada                                                                                            | 565 | Chemical form of tumor-tropic $^{99\text{m}}\text{Tc}$ -DL-homocysteine                                              |
| Stephen W. Wunderly                                                                                                       | 569 | Solid scintillation counting: a new technique for measuring radio-labeled compounds                                  |
| Wang Liyu                                                                                                                 | 575 | Multiplet processing in high resolution gamma spectroscopy                                                           |
| Haruo Fujii, Makoto Takiue and<br>Hiroaki Ishikawa                                                                        | 581 | Analytical measurement of two nuclides using a liquid scintillation counter                                          |
| N. Getoff                                                                                                                 | 585 | Advancements of radiation induced degradation of pollutants in drinking and waste water                              |

|                                                                                    |     |                                                                                                                                                                             |
|------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tien-Ko Wang and Hsueh-Kuo Lu                                                      | 595 | Comparisons between calculated and measured gamma-ray energy-deposition rates in two-dimensional mixed fast-neutron/gamma-ray fields                                        |
| S. E. Simopoulos                                                                   | 607 | Soil sampling and $^{137}\text{Cs}$ analysis of the Chernobyl fallout in Greece                                                                                             |
| H. A. Das, H. A. van der Sloot,<br>G. J. de Groot and R. C. H. Steneker            | 615 | Determination of the apparent diffusion constants in water containing granular solids                                                                                       |
| Q. Salako and A. E. Theobald                                                       | 621 | $^{99\text{m}}\text{Tc}$ -labelling studies of solubilized ligands—Part I                                                                                                   |
| J. Steinbach, E. Loesel, K. Guenther,<br>R. Brueckner and G. J. Beyer              | 625 | A rotating $\text{B}_2\text{O}_3$ target for $^{11}\text{C}$ production with the attributes of a gas target                                                                 |
| Y. M. Huigen, T. G. Tji, W. J. Gelsema and<br>C. L. de Ligny                       | 629 | The binding of $^{99\text{m}}\text{Tc}(\text{Sn})$ -MDP complexes to human serum albumin and other blood proteins determined with gel chromatography and ultrafiltration    |
| G. Gundlach, E. L. Sattler and U. Wagenbach                                        | 637 | Preparation of carrier-free $^{11}\text{C}$ -amino acids by insertion of hot $^{11}\text{C}$ -atoms into valine and 2-aminobutyric acid with retention of optical asymmetry |
| <i>Technical Note</i>                                                              |     |                                                                                                                                                                             |
| Henrik Saaby Johansen, Sigurd Larsen and<br>Victor Middelboe                       | 641 | The stability of oxygen-18 labelled phosphate in aqueous solution                                                                                                           |
| <i>Letter to the Editors</i>                                                       |     |                                                                                                                                                                             |
| I. C. S. F. Jardim, M. Sartoratto, P. R. Saliba,<br>C. Archundia and K. E. Collins | 643 | Preparation of pure $^{51}\text{Cr}(\text{VI})$ and $^{51}\text{Cr}(\text{H}_2\text{O})_6^{3+}$ : problems with acid contaminated PTFE beakers                              |
| <i>Announcement</i>                                                                | 645 |                                                                                                                                                                             |
| <i>Events</i>                                                                      | 646 |                                                                                                                                                                             |

## Number 8

|                                                                                                                                                                                                    |     |                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C. S. Chong, D. A. Bradley and<br>Abdul Ghani Sidek                                                                                                                                                | 651 | The effect of irradiation temperature on track formation in chemically etched LR-115 type II polymer                                                                           |
| T. L. Nam, P. J. Fallon, R. J. Keddy,<br>H. J. van Rijn and Joanne F. Andrews                                                                                                                      | 657 | Detection of nuclear radiation by scintillation counting using synthetic diamond                                                                                               |
| Sven-Johan Heselius, David J. Schlyer<br>and Alfred P. Wolf                                                                                                                                        | 663 | A diagnostic study of proton-beam irradiated water targets                                                                                                                     |
| Shizuko Ambe                                                                                                                                                                                       | 671 | Mössbauer study of iron in the tomato plant                                                                                                                                    |
| Hank F. Kung, Bo-Li Liu and Sangren Pan                                                                                                                                                            | 677 | Kinetic study of ligand exchange reaction between $^{99\text{m}}\text{Tc}$ -glucoheptonate and <i>N</i> -benzyl- <i>N</i> -methyl-piperazinyl-bis-(aminoethanethiol) (BPA-BAT) |
| V. K. Mittal and H. S. Sahota                                                                                                                                                                      | 683 | Measurement of pair production cross sections $\kappa_n$ in the 1.21–11.775 MeV energy range and systematics of $\kappa_n$ up to 100 MeV in Ge                                 |
| Barak Ben-Shachar                                                                                                                                                                                  | 687 | Ultraviolet sensitivity and photo-transferred thermoluminescence of the Harshaw and Panasonic used TLDs—a comparison                                                           |
| Sewak R. Joshi                                                                                                                                                                                     | 691 | Determination of $^{241}\text{Am}$ in sediments by direct counting of low-energy photons                                                                                       |
| C. S. John, M. R. A. Pillai, J. M. Lo<br>and D. E. Troutner                                                                                                                                        | 701 | Labeling of proteins with $^{102}\text{Rh}$                                                                                                                                    |
| V. N. Danilenko, A. A. Konstantinov,<br>N. V. Kurenkov, L. N. Kurchatova,<br>A. B. Malinin, A. V. Mamelin,<br>S. V. Matveev, T. E. Sazonova,<br>E. K. Stepanov, S. V. Sepman<br>and Yu. G. Toporov | 707 | Methods of producing radionuclides for spectrometric gamma-ray sources and their standardization—1. Barium-133                                                                 |



|                                                                                                                                                                              |     |                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------------------------------------------------------|
| V. N. Danilenko, N. P. Gromova,<br>A. A. Konstantinov, N. V. Kurenkov,<br>A. B. Malinin, S. V. Matveev,<br>T. E. Sazonova, E. K. Stepanov,<br>S. V. Sepman and I. N. Tronova | 711 | Methods of producing radionuclides for spectrometric gamma-ray sources and their standardization—2. Europium-152 |
| P. J. Marsden, F. A. Smith and R. W. Evans                                                                                                                                   | 715 | Evidence of conformational changes in the non-equivalent binding sites of human serum transferrin                |
| <i>Technical Notes</i>                                                                                                                                                       |     |                                                                                                                  |
| T. V. Ramachandran and U. C. Mishra                                                                                                                                          | 723 | Measurement of natural radioactivity levels in Indian foodstuffs by gamma spectrometry                           |
| Ravinder Kaur and P. N. Trehan                                                                                                                                               | 727 | Precise measurement of relative gamma ray intensities in the decay of $^{182}\text{Ta}$                          |
| Shetha Selman Al-Dargazelli and<br>Khalid Husain Al-Attiah                                                                                                                   | 729 | Temperature effect on the response function of NaI(Tl) detectors                                                 |
| R. K. Barnes and T. O. Loosz                                                                                                                                                 | 733 | The quantification of Tl and Cu concentrations in $^{201}\text{Tl}$ solutions using anodic stripping voltammetry |
| <i>Events</i>                                                                                                                                                                | 735 |                                                                                                                  |

## Number 9

|                                                                                                                                                                                                                |     |                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stephen M. Moerlein, James W. Brodack,<br>Barry A. Siegel and Michael J. Welch                                                                                                                                 | 741 | Elimination of contaminant Kryptofix 2.2.2 in the routine production of 2-[ $^{18}\text{F}$ ]fluoro-2-deoxy-D-glucose                                                                       |
| Yasushi Arano, Yasuhiro Magata,<br>Kazuko Horiuchi, Kazuya Matsumoto,<br>Yasuhisa Fujibayashi, Yoshiro Ohmomo,<br>Chiaki Tanaka, Hideo Saji and<br>Akira Yokoyama                                              | 745 | Design, synthesis and $^{64}\text{Cu}$ labeling of fatty acid analogs containing dithiosemicarbazone chelate                                                                                |
| S. W. A. Bligh, P. J. Sadler, J. A. Marriott,<br>I. A. Latham and J. D. Kelly                                                                                                                                  | 751 | Characterization and <i>in vivo</i> distribution of $^{99\text{m}}\text{Tc}$ - and $^{111}\text{In}$ -labelled magnetite                                                                    |
| Jeffrey A. Coderre and David A. Halle                                                                                                                                                                          | 759 | Direct electrophilic iodination of 2-thiouracil using Iodo-Gen <sup>TM</sup>                                                                                                                |
| Timothy J. Tewson, William Banks,<br>Mark Franceschini and Joan Hoffpauir                                                                                                                                      | 765 | A trap for the removal of nitrogen oxides from carbon-11 carbon dioxide                                                                                                                     |
| R. A. M. Rizk                                                                                                                                                                                                  | 769 | A Monte Carlo treatment of particle-size effects in gauging and control by gamma-ray absorptiometry in hydraulic transport systems                                                          |
| Jeanette C. Roberts, Sherri L. Newmyer,<br>Janet A. Mercer-Smith, Sandra A. Schreyer<br>and David K. Lavallee                                                                                                  | 775 | Labeling antibodies with copper radionuclides using <i>N</i> -4-nitro-benzyl-5-(4-carboxyphenyl)-10,15,20-tris(4-sulfophenyl) porphine                                                      |
| F. A. Rahman, E. H. El-Kalla and<br>Ensherah E. Ahmed                                                                                                                                                          | 783 | A theoretical model for gamma-ray attenuation and distribution in a laminated shield                                                                                                        |
| V. N. Danilenko, N. P. Gromova,<br>A. A. Konstantinov, N. V. Kurenkov,<br>A. B. Malinin, A. V. Mamelin,<br>S. V. Matveev, T. E. Sazonova,<br>E. K. Stepanov, S. V. Sepman,<br>Yu. G. Toporov and I. N. Tronova | 789 | Methods of producing radionuclides for spectrometric gamma-ray sources and their standardization—3. Holmium-166m                                                                            |
| Jack L. Parker, Robert N. Likes and<br>Aaron Goldman                                                                                                                                                           | 793 | Remeasurement of $^{241}\text{Pu}$ half life by gamma-ray spectrometry                                                                                                                      |
| Juske Horita, Akira Ueda,<br>Kanae Mizukami and Isao Takatori                                                                                                                                                  | 801 | Automatic $\delta\text{D}$ and $\delta^{18}\text{O}$ analyses of multi-water samples using $\text{H}_2$ - and $\text{CO}_2$ -water equilibration methods with a common equilibration set-up |
| Ewa Szlendak and Robert Davis                                                                                                                                                                                  | 807 | The effects of fast electron radiation on the development of <i>Trogoderma granarium</i> Everts (Coleoptera: Dermestidae)                                                                   |

|                                                                              |     |                                                                                                                                                                                             |
|------------------------------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A. Alagui, M. Apparu,<br>A. du Moulinet d'Hardemare,<br>F. Riche et M. Vidal | 813 | Étude de la stabilité de la liaison $^{99m}\text{Tc}\equiv\text{N}$ en fonction du pH: mise en évidence de la transformation de $[\text{}^{99m}\text{TcNCl}_4]^-$ en $^{99m}\text{TcO}_4^-$ |
| <i>Technical Notes</i>                                                       |     |                                                                                                                                                                                             |
| B. R. S. Simpson and B. R. Meyer                                             | 819 | The half-life of $^{125}\text{I}$                                                                                                                                                           |
| S. Croft and D. R. Weaver                                                    | 821 | Characteristic x-ray contamination of fast neutron calibration fields                                                                                                                       |
| <i>Book Reviews</i>                                                          | 823 |                                                                                                                                                                                             |
| <i>Events</i>                                                                | 825 |                                                                                                                                                                                             |

## Number 10-12

# ESR DOSIMETRY AND APPLICATIONS

|                                                     |     |         |
|-----------------------------------------------------|-----|---------|
| D. F. Regulla, A. Scharmann and<br>W. L. McLaughlin | VII | Preface |
|-----------------------------------------------------|-----|---------|

## HISTORICAL PERSPECTIVE

|              |     |                                        |
|--------------|-----|----------------------------------------|
| A. Scharmann | 829 | ESR—a scientific tool for applications |
|--------------|-----|----------------------------------------|

## METHODS AND INSTRUMENTS

|                                                                                              |     |                                                                  |
|----------------------------------------------------------------------------------------------|-----|------------------------------------------------------------------|
| C. Franconi, J. Holowacz,<br>K. V. Ettinger, E. M. Staderini,<br>M. Bonori and R. F. Laitano | 835 | A precise S-band ESR reader for free-radical routine dosimetry   |
| Hidemoto Hara and Motoji Ikeya                                                               | 841 | Frequency-sweep ESR spectrometer for dosimetry and dating        |
| Motoji Ikeya and Masahiro Furusawa                                                           | 845 | A portable spectrometer for ESR microscopy, dosimetry and dating |
| T. Kojima and R. Tanaka                                                                      | 851 | Polymer-alanine dosimeter and compact reader                     |

## CORRELATION WITH OTHER SOLID-STATE EFFECTS

|                                                                                   |     |                                                                                                                                      |
|-----------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------|
| L. E. Halliburton                                                                 | 859 | ESR and optical characterization of point defects in quartz                                                                          |
| K. V. Ettinger                                                                    | 865 | Free radical dosimetry techniques and their suitability for precise and accurate measurements of radiation                           |
| Juan Azorín, Alicia Gutiérrez, Eduardo Muñoz<br>and Roberto Gleason               | 871 | Correlation of ESR with lyoluminescence dosimetry using some sugars                                                                  |
| H. Kundu, T. Sur, B. Mitra and<br>S. C. Roy                                       | 875 | Study of decay of trapping centres of free radicals in high-temperature icy states of saccharides by lyoluminescence and ESR methods |
| I. K. Oommen, K. S. V. Nambi,<br>S. Sengupta, T. K. Gundu Rao<br>and M. Ravikumar | 879 | Lactose and "Tris" lyoluminescence dosimetry systems and ESR correlation studies                                                     |

## DOSIMETRY

|                                                                      |     |                                                                                                                    |
|----------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|
| K. Van Laere, J. Buysse and<br>P. Berkvens                           | 885 | Alanine in high-dose dosimetry: spectrophotometric and electrochemical readout procedures compared with ESR        |
| D. Kotzias and R. Beyerle-Pfnür                                      | 897 | Characterization of humic substances by ESR spectroscopy                                                           |
| J. A. Simmons                                                        | 901 | Thermal effects in irradiated amino acids                                                                          |
| H. Y. Göksu, A. Wieser, A. Waibel,<br>A. Vogenauer and D. F. Regulla | 905 | Comparing measurements of free radicals, optical density and thermoluminescence in solids for high-level dosimetry |
| A. Wieser and D. F. Regulla                                          | 911 | ESR dosimetry in the "gigarad" range                                                                               |

## DOSIMETRY—RESPONSE TO NEUTRONS AND HEAVY IONS

|                               |     |                                                                                                         |
|-------------------------------|-----|---------------------------------------------------------------------------------------------------------|
| J. Hüttermann and A. Schaefer | 915 | Heavy-ion-induced free radical formation in solid DNA-constituents: quantitative and structural aspects |
|-------------------------------|-----|---------------------------------------------------------------------------------------------------------|



- M. P. R. Waligórski, G. Danialy,  
Kim Sun Loh and R. Katz 923 The response of the alanine detector after charged-particle and  
neutron irradiations
- J. W. Hansen and K. J. Olsen 935 Predicting decay in free-radical concentration in L- $\alpha$ -alanine  
following high-LET radiation exposures
- H. Schraube, E. Weitzenegger,  
A. Wieser and D. F. Regulla 941 Fast neutron response of alanine probes

## REFERENCE DOSIMETRY

- W. L. McLaughlin 945 Reference dosimetry and measurement quality assurance
- J. W. Nam and D. F. Regulla 953 The significance of the International Dose Assurance Service for  
radiation processing
- A. Wieser, R. Siegele and  
D. F. Regulla 957 Influence of the irradiation temperature on the free-radical  
response of alanine
- T. J. L. Sollier, D. C. Mosse,  
M. M. T. Chartier and J. E. Joli 961 The LMRI ESR/alanine dosimetry system: description and  
performance
- A. Miller, A. Kovács, A. Wieser  
and D. F. Regulla 967 Measurements with alanine and film dosimeters for industrial  
10 MeV electron reference dosimetry
- P. P. Pańta, G. Strzelczak-Burlińska  
and Z. Tomasiński 971 ESR/L-alanine system as a proposed standard dosimeter for  
electron-beam irradiations
- F. Coninckx, H. Schönbacher, A. Bartolotta,  
S. Onori and A. Rosati 977 Alanine dosimetry as the reference dosimetric system in accelerator  
radiation environments

## TRANSFER DOSIMETRY

- K. J. Olsen, J. W. Hansen and  
M. P. R. Waligórski 985 ESR dosimetry in calibration intercomparisons with high-energy  
photons and electrons
- Manfred K. H. Schneider 989 Realization and dissemination of the unit of absorbed dose to water  
in the dose range of radiation therapy
- S. Chu, A. Wieser, H. Feist and  
D. F. Regulla 993 ESR/alanine dosimetry of high-energy electrons in radiotherapy
- P. Hjortenberg, J. W. Hansen and  
M. Wille 997 Measurement of dose rate from  $^{106}\text{Ru}/^{106}\text{Rh}$  ophthalmic applicators  
by means of alanine-polymer foils
- A. Bartolotta, S. Onori and  
M. Pantalonì 1003 Intercomparison of the dosimetric system used in industrial  
irradiation plants in Italy
- Elisabeth Marta Dorda 1009 Dose control in the semi-industrial irradiation plant at Ezeiza  
Atomic Center

## RADIATION ACCIDENT DOSIMETRY

- B. G. Dalgarno and J. D. McClymont 1013 Evaluation of ESR as a radiation accident dosimetry technique
- Motoji Ikeya and Hiroshi Ishii 1021 Atomic bomb and accident dosimetry with ESR: natural rocks and  
human tooth *in-vivo* spectrometer
- J. Barthe, V. Kamenopoulou,  
B. Cattoire and G. Portal 1029 Dose evaluation from textile fibers: a post-determination of initial  
ESR signal
- Tatsuya Shimano, Midori Iwasaki,  
Chyuzo Miyazawa,  
Toshikatsu Miki, Ayako Kai  
and Motoji Ikeya 1035 Human tooth dosimetry for gamma-rays and dental x-rays using  
ESR
- D. F. Regulla and U. Deffner 1039 Dose estimation by ESR spectroscopy at a fatal radiation accident

## DATING—GENERAL ASPECTS

- Rainer Grün 1045 Present status of ESR-dating
- G. Hütt and J. Jaek 1057 Dating accuracy from laboratory reconstruction of palaeodose

- R. G. Lyons and B. J. Brennan 1063 Alpha-particle effectiveness in ESR dating: energy dependence and implications for dose-rate calculations
- Liang Renyou, Peng Zicheng, Jin Sizhao and Huang Peihua 1071 Estimation of the influence of experimental conditions on ESR dating results
- Rainer Grün and Peter D. M. MacDonald 1077 Non-linear fitting of TL/ESR dose-response curves

#### DATING—CARBONATES

- Anne F. Skinner 1081 ESR dosimetry and dating in aragonitic mollusks
- Anatoly Molodkov 1087 The problem of long-term fading of absorbed palaeodose on ESR-dating of Quaternary mollusc shells
- B. W. Smith, P. L. Smart, P. J. Fox, J. R. Prescott and M. C. R. Symons 1095 An investigation of ESR signals and their related TL emission in speleothem calcite
- M. Barabas, A. Bach, M. Mudelsee and A. Mangini 1105 Influence of the Mg-content on ESR-signals in synthetic calcium carbonate
- O. Katzenberger, R. Debuyst, P. De Cannière, F. Dejeht, D. Apers and M. Barabas 1113 Temperature experiments on mollusc samples: an approach to ESR signal identification
- Huang Peihua, Liang Renyou, Jin Sizhao, Peng Zicheng and Nathaniel W. Rutter 1119 Study on accumulated dose in littoral shells of Argentina
- Chen Yijian, P. Fortin and Qiao Li 1123 A preliminary study on ESR dating of sediments from Curitiba Basin, Brazil
- Peng Zicheng, Jin Sizhao, Liang Renyou, Huang Peihua, Quan Yucai and M. Ikeya 1127 Study on comparison of ESR dating of coral and shells with  $^{230}\text{Th}/^{234}\text{U}$  and  $^{14}\text{C}$  methods
- A. M. Rossi and G. Poupeau 1133 Radiation-induced paramagnetic species in natural calcite speleothems
- Ayako Kai and Motoji Ikeya 1139 ESR study of fossil shells in sediments at Hamana Lake
- Tatsuhiko Arakawa and Nobuyuki Hori 1143 ESR dating of carbonate speleothem rings and late Quaternary climatic changes in the Ryukyu Islands, Japan
- C. Jacobs, P. De Cannière, F. Dejeht and D. Apers 1147 ESR study of gamma-ray irradiated synthetic calcium carbonates
- R. G. Lyons, P. C. Crossley, R. G. Ditchburn, W. J. McCabe and N. Whitehead 1153 Radon escape from New Zealand speleothems
- A. M. Özer, A. Wieser, H. Y. Göksu, P. Müller, D. F. Regulla and O. Erol 1159 ESR and TL age determination of caliche nodules

#### DATING—OTHER MINERALS AND ENAMEL

- Chen Yijian, A. V. Arakel and Lu Jinfen 1163 Investigation of sensitive signals due to gamma-ray irradiation of chemical precipitates. A feasibility study for ESR dating of gypsum, phosphate and calcrete deposits
- Shin Toyoda and Motoji Ikeya 1171 ESR as a paleothermometer of volcanic materials
- N. Imai and K. Shimokawa 1177 ESR dating of the tephra "Crystal Ash" distributed in Shinshu, central Japan
- Tatsuro Fukuchi 1181 Theoretical study on frictional heat by faulting using ESR
- M. F. Desrosiers, M. G. Simic, F. C. Eichmiller, A. D. Johnston and R. L. Bowen 1195 Mechanically-induced generation of radicals in tooth enamel
- Tai Soo Chong, Hiroyuki Ohta, Yoshiyuki Nakashima, Takao Iida, Kengo Ieda and Hideo Saisho 1199 ESR dating of elephant teeth and radiation dose rate estimation in soil



## IDENTIFICATION OF IRRADIATED FOOD

- K. W. Bögl 1203 Identification of irradiated foods—methods, development and concepts
- N. J. F. Dodd, J. S. Lea and A. J. Swallow 1211 The ESR detection of irradiated food
- J. Raffi, J. C. Evans, J-P. Agnel, C. C. Rowlands and G. Lesgards 1215 ESR analysis of irradiated frogs' legs and fishes
- Motoji Ikeya, Folho O. Baffa and Sergio Mascarenhas 1219 Quality assessment of coffee beans with ESR and gamma-ray irradiation
- Technical Note*
- Gordon J. Troup, John R. Pilbrow, Don R. Hutton, Charles R. Hunter and Graham L. Wilson 1223 EPR detection of free radicals in (I) coffee and (II) gamma-ray irradiated foodstuffs

## ESR IMAGING AND OTHER APPLICATIONS

- Gareth R. Eaton, Sandra S. Eaton and Martin M. Maltempo 1227 Three approaches to spectral-spatial EPR imaging
- P. Höfer, K. Holczer and D. Schmalbein 1233 Characterization of gamma-ray irradiated powder alanine samples by pulsed EPR
- Yasuyuki Morita, Keiichi Ohno, Kazutoshi Ohashi and Junkichi Sohma 1237 ESR imaging investigation on depth profiles of radicals in organic solid dosimetry
- T. Miki 1243 ESR spatial dosimetry using localized magnetic field modulation

# AUTHOR INDEX

- Abdul-Bari I. S., 467  
 Abrams D. N., 251  
 Aburai T., 291  
 Adam M. J., 91  
 Adesanmi C. A., 243, 263  
 Agnel J. P., 1215  
 Ahafia A. K., 403, 407  
 Ahmed E. E., 783  
 Ajdinović B., 225  
 Al Mudaires J., 467  
 Alagui A., 813  
 Al-Attiah K. H., 729  
 Al-Dargazelli S. S., 421, 729  
 Alexoff D., 1  
 Alvarez J. G., 536  
 Ambe S., 671  
 Anand I. S., 89  
 Ando A., 521  
 Ando I., 521  
 Andrews J. F., 657  
 Antoni G., 561  
 Apers D., 1113, 1147  
 Apparu M., 813  
 Arakawa T., 1143  
 Arakel A. V., 1163  
 Arano Y., 745  
 Archer G. E. Jr, 485  
 Archundia C., 643  
 Augustine S. C., 27  
 Awwad Z., 163, 217  
 Azorín J., 871  
  
 Bach A., 1105  
 Baffa F. O., 1219  
 Bakr S., 428  
 Ballinger J. R., 95, 547  
 Balogun F. A., 243  
 Banks W., 765  
 Barabas M., 1105, 1113  
 Barnes R. K., 733  
 Barrio J. R., 433  
 Barthe J., 1029  
 Bartolotta A., 977, 1003  
 Bashter I. I., 257  
 Bayomy T., 163, 217  
 Ben-Shachar B., 687  
 Benzing R., 89  
 Berkvens P., 885  
 Beyer G. J., 625  
 Beyerle-Pfnür R., 897  
 Bialoń J., 19  
 Bida G. T., 433  
 Bigner D. D., 485  
 Bijma A. T., 47  
 Biramontri S., 349  
 Bjurling P., 557  
 Bligh S. W. A., 751  
 Bludovský R., 355  
 Bogdanova V., 225  
 Bögl K. W., 1203  
 Bonasera T. A., 117  
 Bonori M., 835  
 Bowen R. L., 1195  
 Bradley D. A., 651  
 Brady F., 325  
 Brennan B. J., 1063  
 Bretscher M. M., 199  
 Brihaye C., 183  
 Brits R. J. N., 103  
 Brodack J. W., 741  
 Brücke T., 455  
  
 Brueckner R., 625  
 Bui C., 375  
 Buysse J., 885  
  
 Çakır N., 209  
 Caldas L. V. E., 93  
 Callahan A. P., 183  
 Cattoire B., 1029  
 Chakarvarti S. K., 239  
 Chartier M. M. T., 961  
 Chen C. C., 315  
 Cheng W. L., 315  
 Chong C. S., 651  
 Chong T. S., 1199  
 Chu S., 993  
 Cloutier N. R., 63  
 Coderre J. A., 759  
 Coetzee P. P., 525  
 Collins K. E., 643  
 Confalonieri L., 375  
 Coninckx F., 977  
 Counsell R. E., 57  
 Croft S., 821  
 Crossley P. C., 1153  
 Cuthbertson A. Z., 545  
 Czauderna M., 177  
  
 Dalgarno B. G., 1013  
 Danyialy G., 923  
 Danilenko V. N., 707, 711, 789  
 Dannals R. F., 369  
 Darwish N. Z., 417  
 Das H. A., 153, 615  
 Dave N. K., 63  
 Davis R., 807  
 De Cannière P., 1113, 1147  
 De Gregori L., 385  
 De Leenheer A., 57  
 Debuyst R., 1113, 1147  
 Deffner U., 1039  
 Dejehet F., 1113, 1147  
 Dence C. S., 117  
 Desrosiers M. F., 1195  
 Dewez S., 183  
 Dighton J. C., 545  
 Dijkman J. A. R., 47  
 Ditchburn R. G., 1153  
 Dixon W. R., 247  
 Djokić D., 225  
 Dodd N. J. F., 1211  
 Domenech R. G., 536  
 Dorda E. M., 1009  
 Dryák P., 513  
  
 Eaton G. R., 1227  
 Eaton S. S., 1227  
 Ebifegha M. E., 73  
 Ehrenkauf R. E., 425  
 Eichholz G. G., 337  
 Eichmiller F. C., 1195  
 El-Ashry F. M., 417  
 El-Kalla E. H., 159, 783  
 El-Kolaly M. A., 257  
 Elias M. M., 421  
 Endo K., 397  
 Erol O., 1159  
 Eschweiler H., 133  
 Ettinger K. V., 835, 865  
 Evans J. C., 1215  
 Evans R. W., 715  
  
 Fahad A. A., 340  
 Fallon P. J., 657  
 Fardeau J. C., 273  
 Farrar H. IV, 199  
 Feist H., 993  
 Feliu A. L., 531  
 Finn R., 265, 455  
 Fortin P., 1123  
 Fourie P. J., 525  
 Fox P. J., 1095  
 Franceschini M., 765  
 Franconi C., 835  
 Fujibayashi Y., 745  
 Fujii H., 235, 495, 581  
 Fujita S., 397  
 Fukuchi T., 1181  
 Fukuhara T., 285  
 Furusawa M., 845  
  
 Garg P. K., 485  
 Gatley S. J., 541  
 Gaudreault R. C., 251  
 Gee A. D., 171  
 Gehringer P., 133  
 Gelsema W. J., 431, 629  
 Getoff N., 585  
 Gleason R., 871  
 Goethals P., 57  
 Göksu H. Y., 905, 1159  
 Goldman A., 793  
 Grierson J. R., 91  
 Gromova N. P., 711, 789  
 Groot G. J. de, 615  
 Grün R., 1045, 1077  
 Guenther K., 625  
 Guillaume M., 183  
 Gulenchyn K. Y., 95, 547  
 Gundlach G., 637  
 Gutiérrez A., 871  
  
 Halldin C., 261, 557  
 Halle D. A., 759  
 Halliburton L. E., 859  
 Hansen J. W., 935, 985, 997  
 Hanser A., 309  
 Hara H., 841  
 Hassan M. N., 547  
 Herranz M., 85  
 Herscheid J. D. M., 47  
 Heselius S.-J., 663  
 Heusser G., 393  
 Hino Y., 79  
 Hiraki T., 521  
 Hisada K., 521  
 Hjortenbergs P., 997  
 Höfer P., 1233  
 Hoffpauir J., 765  
 Holczer K., 1233  
 Holowacz J., 835  
 Hölta P., 37  
 Homma Y., 291, 295  
 Hori N., 1143  
 Horita J., 801  
 Horiuchi K., 745  
 Houle S., 279  
 Hsu P.-C., 329  
 Huigen Y. M., 431, 629  
 Hunter C. R., 1223  
 Hütt G., 1057  
 Hüttermann J., 915



- Hutton D. R., 1223  
Hwang D.-R., 117
- Ieda K., 1199  
Iida T., 1199  
Ikeya M., 841, 845, 1021, 1035, 1127,  
1139, 1171, 1219  
Imai N., 1177  
Ishii H., 1021  
Ishikawa H., 235, 581  
Isoyama M., 285  
Isozumi Y., 299  
Ito S., 299, 539  
Ito Y., 397  
Iwasaki M., 1035
- Jacobs C., 1147  
Jaek J., 1057  
Jardim I. C. S. F., 643  
Jimbow K., 539  
Jinfen L., 1163  
Jivan S., 91  
Johansen H. S., 641  
John C. S., 701  
Johnston A. D., 1195  
Joli J. E., 961  
Joshi S. R., 691  
Jossan S. S., 557
- Kai A., 1035, 1139  
Kaji H., 491  
Kamenopoulou V., 1029  
Kansouh W. A., 257, 477  
Katano R., 299  
Katz R., 923  
Katzenberger O., 1113  
Kaur R., 33, 727  
Kawada Y., 79  
Keddy R. J., 657  
Kelly J. D., 751  
Kiesewetter D. O., 455  
Kishimoto S., 299  
Kitaori S., 343  
Kits J., 355  
Klapdor H. V., 393  
Knapp F. F. Jr, 183  
Kohno N., 41, 346  
Kojima T., 851  
Konstantinov A. A., 707, 711, 789  
Kotzias D., 897  
Kovács A., 967  
Kovář P., 513  
Kundu H., 875  
Kung H. F., 677  
Kurchatova L. N., 707  
Kurenkov N. V., 707, 711, 789
- Lafuente O. M. de, 85  
Laitano R. F., 835  
Lambrecht R. M., 428  
Landais P., 265  
Långström B., 171, 557, 561  
Larsen S., 641  
Lasne M.-C., 147  
Látal F., 355  
Latham I. A., 751  
Lavallee D. K., 775  
Lea J. S., 1211  
Lee C. S., 315  
Legarda F., 85  
Lesgards G., 1215  
Li Q., 1123
- Ligny C. L. de, 153, 431, 629  
Likes R. N., 793  
Lilla E., 365  
Lim T.-P., 63  
Liu B.-L., 677  
Liyu W., 575  
Lo J. M., 701  
Lobos S., 385  
Loesel E., 625  
Logan B. A., 247  
Loh K. S., 923  
Loosz T. O., 733  
Lu H.-K., 595  
Luthra S. K., 325  
Luxen A., 433  
Lyons R. G., 1063, 1153
- Maaty A. A., 159  
MacDonald D. M., 1077  
Machulla H.-J., 428  
Magata Y., 745  
Makarious A. S., 257, 473, 477  
Malinin A. B., 707, 711, 789  
Malmborg P., 171  
Maltempo M. M., 1227  
Mamelin A. V., 707, 789  
Mangini A., 1105  
Mansour N., 163, 213, 217, 393  
Marks A., 279  
Marriott J. A., 751  
Marsden P. J., 715  
Martí A. F., 536  
Martynov V., 213  
Mascarenhas S., 1219  
Matsumoto K., 745  
Matveev S. V., 707, 711, 789  
McCabe W. J., 1153  
McClymont J. D., 1013  
McLaughlin W. L., 945  
Mendez O. A., 536  
Mercer-Smith J. A., 775  
Meyer B. R., 819  
Middelboe V., 641  
Miki T., 1035, 1243  
Milazzo M., 375  
Miller A., 967  
Mishra U. C., 723  
Mittal V. K., 683  
Mitra B., 875  
Miyahara H., 343  
Miyazawa C., 1035  
Mizukami K., 801  
Moerlein S. M., 741  
Molodkov A., 1087  
Morel C., 273  
Morita Y., 1237  
Mosse D. C., 961  
Moulinet d'Hardemare A. du, 813  
Mudelsee M., 1105  
Mukoyama T., 491  
Müller P., 1159  
Muñoz E., 871  
Murase Y., 291, 295  
Murray W. J., 27
- Nakajima T., 491  
Nakashima Y., 1199  
Nam J. W., 953  
Nam T. L., 657  
Namba H., 53  
Nambi K. S. V., 879  
Németh Zs., 519
- Newmyer S. L., 775  
Nieuwland R. J. A., 153  
Noujaim A. A., 251  
Nozue Y., 343
- Ohashi K., 1237  
Ohmomo Y., 745  
Ohno K., 1237  
Ohta H., 1199  
Okada S., 565  
Oliver B. M., 199  
Olsen K. J., 935, 985  
Omar Kh. M., 417  
Onori S., 977, 1003  
Oommen I. K., 879  
Oreland L., 557  
Özer A. M., 1159
- Padgett H. C., 433  
Pan S., 677  
Pañta P. P., 971  
Pantaloni M., 1003  
Parker J. L., 793  
Peihua H., 1071, 1119, 1127  
Pellmar T. C., 7  
Perez G., 365  
Piepke A., 393  
Pike V. W., 147, 325  
Pilbrow J. R., 1223  
Pillai M. R. A., 701  
Plch J., 513  
Poppell S. W., 337  
Portal G., 1029  
Possagno E., 365  
Poupeau G., 1133  
Poupeye E., 57  
Prescott J. R., 1095  
Proksch E., 133  
Proulx A., 95  
Pychlau P., 93
- Qaim S. M., 127
- Raffi J., 1215  
Rahman F. A., 159, 783  
Ram K. D., 505  
Ram S., 413, 425  
Ramachandran T. V., 723  
Rao T. K. G., 879  
Rastovac M., 225  
Ravert H. T., 369  
Ravikumar M., 879  
Reed K. W., 27  
Regulla D. F., 93, 905, 911, 941, 953,  
957, 967, 993, 1039, 1159  
Reilly R., 279  
Renyou L., 1071, 1119, 1127  
Rice D. E., 183  
Riche F., 813  
Rijn H. J. van, 657  
Rizk R. A. M., 769  
Roberts J. C., 775  
Rochalska M., 177  
Rosa L. A. R. da, 139  
Rosati A., 977  
Rosenberg R., 37  
Rossi A. M., 1133  
Rowlands C. C., 1215  
Roy S. C., 875  
Rutter N. W., 1119
- Saad S. S., 417  
Sabol J., 467

- Sadler P. J., 751  
 Sahota H. S., 683  
 Saji H., 745  
 Saisho H., 1199  
 Sajjad M., 428  
 Salako Q., 621  
 Saliba P. R., 643  
 Sartoratto M., 643  
 Sattler E. L., 637  
 Satyamurthy N., 433  
 Sayedahmed F. M., 473, 477  
 Sazonova T. E., 707, 711, 789  
 Schaefer A., 915  
 Scharmann A., 829  
 Schauer D. A., 7  
 Schlyer D. J., 1, 663  
 Schmalbein D., 1233  
 Schmidt D. G., 433  
 Schneider J., 393  
 Schneider M. K. H., 989  
 Schoeps K.-O., 261  
 Scholten B., 127  
 Schönbacher H., 977  
 Schrader H., 381  
 Schraube H., 941  
 Schreyer S. A., 775  
 Sekine T., 491, 513  
 Sengupta S., 879  
 Sepman S. V., 707, 711, 789  
 Sheldon K., 279  
 Shimada A., 285  
 Shimano T., 1035  
 Shimokawa K., 1177  
 Shinohara N., 41, 346  
 Sidek A. G., 651  
 Siebert B. D., 545  
 Siegel B. A., 741  
 Siegele R., 957  
 Silva H., 109  
 Simic M. G., 1195  
 Simmons J. A., 901  
 Simopoulos S. E., 607  
 Simpson B. R. S., 819  
 Singh N., 239  
 Singh P., 239  
 Sizhao J., 1071, 1119, 1127  
 Skálberg M., 37  
 Skarnemark G., 37  
 Skinner A. F., 1081  
 Slegers G., 57  
 Sloot H. A. van der, 615  
 Smart P. L., 1095  
 Smith B. W., 1095  
 Smith F. A., 715  
 Sohma J., 1237  
 Sollier T. J. L., 961  
 Somayaji V., 539  
 Sosiński T., 19  
 Spicer L. D., 413, 425  
 Staderini E. M., 835  
 Stålnacke C.-G., 557  
 Steinbach J., 625  
 Steneker R. C. H., 615  
 Stepanov E. K., 707, 711, 789  
 Stöcklin G., 127  
 Stone-Elander S., 261  
 Storey R. S., 247  
 Strecker H., 393  
 Strzelczak-Burlińska G., 971  
 Sur T., 875  
 Suzuki N., 53  
 Suzuki T., 397  
 Swallow A. J., 1211  
 Symons M. C. R., 1095  
 Szinovatz W., 133  
 Szlendak E., 807  
 Tadžer I., 225  
 Takatori I., 801  
 Takeda A., 565  
 Takekoshi H., 299  
 Takiue M., 235, 291, 295, 495, 581  
 Tanaka C., 745  
 Tanaka M., 285  
 Tanaka R., 851  
 Tedroff J., 171  
 Tewson T. J., 765  
 Theobald A. E., 621  
 Thongmitr W., 349  
 Ting G., 315  
 Tji T. G., 431, 629  
 Tokay R. K., 37  
 Tokunaga O., 53  
 Tomasiński Z., 971  
 Toporov Yu. G., 707, 789  
 Toyoda S., 1171  
 Trehan P. N., 33, 727  
 Tripathi R., 505  
 Tronova I. N., 711, 789  
 Troup G. J., 1223  
 Troutner D. E., 701  
 Turton D. R., 147  
 Ueda A., 801  
 Ueda C. T., 27  
 Ujhelyi Cs., 461  
 Ulin J., 171, 561  
 Van Laere K., 885  
 Vasisht C. M., 467  
 Vidal M., 813  
 Visser G. W. M., 47  
 Vogenauer A., 905  
 Wagenbach U., 637  
 Wagner H. N. Jr, 369  
 Waibel A., 905  
 Waligórski M. P. R., 923, 985  
 Walt T. N. van der, 525  
 Wang T.-K., 329, 595  
 Wang Y. M., 315  
 Wanitsuksombut W., 349  
 Watanabe T., 343  
 Weaver D. R., 821  
 Weitzenegger E., 941  
 Welch M. J., 117, 741  
 Weng P.-S., 329  
 Whitehead N., 1153  
 Wiebe L. I., 539  
 Wieser A., 905, 911, 941, 957, 967, 993, 1159  
 Wille M., 997  
 Wilson A. A., 369  
 Wilson G. L., 1223  
 Wolf A. P., 1, 663  
 Wunderly S. W., 569  
 Wyllie H. A., 501  
 Yamada N., 521  
 Yeşin T., 209  
 Yijian C., 1123, 1163  
 Yokoyama A., 745  
 Yoshihara K., 491, 519  
 Yuasa S., 285  
 Yucai Q., 1127  
 Zalutsky M. R., 485  
 Zastawny A., 19  
 Zeman G. H., 7  
 Zicheng P., 1071, 1119, 1127  
 Zmbova B., 225  
 Zwan L. van der, 247